Annual Report

1990

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EYE ON HEALTH

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Myrna Jarrett keeps one eye on the ball and the other on her good health. Two years ago she was struck almost senseless and immobile with a sudden stroke. Two days later she'd almost completely recovered because a Calgary Heritage Medical Researcher – Dr. Bruce Tranmer – gave her new stroke therapy. It's based on increasing blood flow to the brain to prevent permanent tissue damage.

The Alberta Heritage Foundation For Medical Research

The Foundation supports medical researchers at the Universities of Alberta and Calgary. It was established in 1979 by the Government of Alberta with a $300 million endowment and operates on the investment earnings of the endowment.

In the last decade the Foundation has contributed over $290 million directly to the Alberta medical research community. The majority of these funds support scientists recruited from Canada and around the world. Other grants support young researchers in training. A special clinical research program encourages physicians to engage in research and another special program supports commercialization of medical innovations. For a listing of grants see page 27.

For a more complete description of all the research funded, see the Third Triennial Report 1989 and the bimonthly newsletters.

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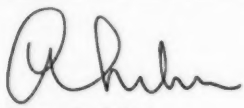
Chairman's Letter

On behalf of the Trustees of the Alberta Heritage Foundation for Medical Research, I am pleased to present the tenth Annual Report covering 1989-90 activities.

The research described here indicates the Foundation continues to fulfil its mandate with impressive success and work in the labs is having an increasing impact on health care in Alberta.

As last year's Triennial Report pointed out, the future of the Foundation and the future of what has become commonly known as "the health care crisis" are at a crossroads. I speak for all the new trustees when I say it's exciting to become part of this organization at a time when there are fabulous challenges out there. One of them is the opportunity to move into more health care and population-based research, while continuing to excel in the basic biomedical sciences. If the Foundation's endowment is supplemented, I am confident that it could become a Canadian leader in health care research that would provide information to help us sort out challenging health care issues.

The Foundation has a solid base as a result of the outstanding leadership of its founding President, Dr. Lionel McLeod and the founding trustees led by Mr. Eric Geddes. We are extremely fortunate to have attracted Dr. Matthew Spence as the new president because his energy, experience and esteem in the medical research community are what the Foundation needs to carry it into new spheres of medical research activity in cooperation with the universities and health care organizations.



Alvin G. Libin
Chairman

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Donald R. Seaman
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Peter Seland
M.D., Calgary

Arthur Wilson
M.D., M.Sc., Edmonton, (Vice-Chairman)

Report From the Presidents

Dr. McLeod, left, Dr. Spence, right.

Dr. Lionel McLeod – (President 1981-July, 1990)

During 1989/90 numerous highlights emerged from Foundation programs and the medical research labs they support. The sampling of achievements described in this report indicates clearly the breadth of research in the province.

Nineteen new investigators are in place, the majority of them working in multidisciplinary groups. The diabetes research illustrates how clusters of scientists bring diverse expertise and approaches to a common interest.

The number of technology transfer grant applications we received is evidence that many innovations are coming out of the labs and that industry is recognizing the possibilities for commercializing them. The Phase III program, known as the Alberta Medical Innovations Plan, is off to a necessarily slow start because these are high risk ventures and the grants requested are large, but it is a promising start.

The Report of the Premier's Commission on Future Health Care for Albertans focused on one of the primary concerns of the Foundation—the need for more health care and epidemiological research. Slow progress in Alberta and elsewhere reflects the serious shortage of well-trained investigators and the need for more support systems for this spectrum of research. This year, as in past years, the Foundation has addressed the issue within the limits of its financial resources by funding clinical researchers/physicians with basic research training who can help take new knowledge to the bedside. Physicians such as Alexandra Lucas whose work is described in this report are returning to Alberta after Foundation-funded speciality research training abroad. We need to recruit and support many more scientists to investigate health promotion, disease prevention, health care outcomes, technology evaluation and clinical epidemiology. To do this requires massive funding, for this kind of research is very expensive. The Foundation would require an initial annual increment of some $3 million to get it off the ground and at least $30 million annually by the fifth or sixth year of a dedicated and successful initiative.

The Foundation has placed some excellent people in the universities who, with additional expertise, could participate in pioneering health care research. The Foundation also has credibility with and access to, the national agencies, institutions, and various parties in the overall health care system which would necessarily be involved in such a major thrust. It's important that the Foundation be given the opportunity to foster and develop urgently required research with the same energy that has resulted in successful endeavors over the past ten years.

This report is the last I will write as President of the Alberta Heritage Foundation for Medical Research. I accepted a new position in British Columbia as Vice-President, Medical Services, University Hospital and Scientific Director of Health Care Research, University of British Columbia. On August 1st Dr. Matthew Spence became the Foundation's President. I am sincerely grateful to all the people who have served the Foundation in this and past years: the many provincial, national and international scientists who served on advisory committees; the Trustees, particularly the founding Chairman, Mr. Eric Geddes; colleagues in the universities and medical community whose counsel and support have been invaluable to me; and the loyal dedicated staff. All of them have played an important role in implementing a remarkable and unique initiative called the Alberta Heritage Foundation for Medical Research.

It has been a rare and tremendous privilege to serve as founding President of such an ambitious and unusual undertaking made possible in 1979 by the vision of the then fledgling Alberta medical research

community and the premier at the time, Honourable Peter Lougheed. There have been many satisfactions: watching the medical research community build in depth and breadth with new strength for excellent researchers already here and entirely new areas of research emerging, attracting some investigators with international acclaim in their fields, pioneering a clinical research program in Canada. Certainly one of the most gratifying experiences has been watching some bright, young Albertans develop into first-class medical researchers who can hold their own anywhere in the world.

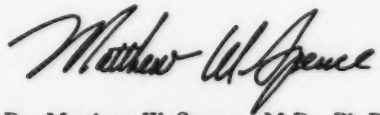
It is with great confidence I applaud Matt Spence's appointment as the new president. He is an admired colleague and friend of many years in the national medical research community and I know he will bring a vision of excellence and renewed vigour to the Foundation. I also know he is working with a dedicated and supportive Board of Trustees, and Mr. Alvin Libin, an experienced and vigorous chairman. I leave with pride in the Foundation and the scientists who are the essence of it and extend sincere best wishes to the new president and board who, I know, will take the Foundation into new phases so it can meet the challenge of creating better and affordable health care in the future.

Dr. Lionel McLeod, M.D.
President

Dr. Matthew Spence (President, August 1, 1990)

I am very excited about playing a small part in the remarkable events taking place in Alberta, some of which are outlined in this Annual Report. As an Albertan-turned-Maritimer prior to this appointment, and a member of many Medical Research Council of Canada Committees, I can assure you that the rest of Canada is very cognizant of the burgeoning developments in medical research in our province, and of the catalytic role played by the Alberta Heritage Foundation for Medical Research in partnership with the biomedical community. The standards of performance set and maintained by Alberta researchers and the AHFMR are universally respected, and to be a Heritage Scholar or Scientist is viewed as a major achievement. The research findings of Alberta-based researchers, only a few of which are touched on this report, are having a major impact on scientific thinking throughout the world. You have done very well!

But what of the future? There is an Indian adage which states that "you must walk miles in another man's moccasins before you understand him". The responsibilities of the President of AHFMR are no different, and so there will be no major immediate changes in the objectives of the Foundation or in the programs put in place to realize these objectives. But there will be change eventually, for such is the nature of human endeavour in general and science in particular, and the Foundation is no exception. Any changes will be based on the best advice we can get from the widest range of stake holders possible. There are exciting times ahead and, like the eye on the cover of this report, I look forward to the future.



Dr. Matthew W. Spence, M.D., Ph.D.,
President

Heritage Medical Researchers are among the world leaders in the march to victory. While contributing the advances described here, they offer Albertans superior patient care in diabetic clinics.

Since a risk of juvenile diabetes is inherited, could doctors predict Chris and David would get it? Scientists have known about susceptibility factors located on chromosome 6 and recently Dr. Leigh Field identified another genetic factor on chromosome 14 that interacts with the first two. Being able to predict who is at risk is an advance because researchers are finding new ways to treat and even prevent the disease.

Dr. Ji-Won Yoon is the first to show that exposure to a particular virus makes some people susceptible to juvenile diabetes, referred to as insulin-dependent Type I diabetes.

Dr. David Severson's research on cardiac metabolism includes studies of how diabetes alters the metabolism.

Dr. Tom Clandinin has shown that altering the fatty acid composition of diet alters insulin responsiveness and nutrient absorption in diabetic animals. He is currently testing the diet therapy in patients.

Dr. Alex Rabinovitch and others study how a diabetic's immune cells mistakenly attack and destroy the healthy, insulin-producing islet cells shown here. If the process can be identified at the molecular level, researchers think they can halt or prevent it. Dr. Rabinovitch has found certain chemicals produced by immune cells destroy islet cells in animals at a certain age and stage of the disease, but at another stage can prevent the disease.

Dr. Rabinovich works closely with Dr. Bhagirath Singh in further developing his vaccine for diabetes. Last year Dr. Singh discovered that a single injection of Freund's adjuvant prevented diabetes in genetically susceptible animals and this year he identified two substances that are responsible for the effects of the vaccination.

Early in 1989 Drs. Garth Warnock, Norman Kneteman and Ray Rajotte were the first Canadians to successfully transplant insulin-producing islets into diabetics, evidence that diabetes could possibly be reversed in some people. The patients are doing well, but the insulin production of the transplanted cells has decreased with time. The team is finding ways to increase the number of islets that can be transplanted in the next patients.

In joint and individual studies, these scientists approach the challenge of diabetes from many different perspectives.The Foundation encourages the development of multidisciplinary groups such as this. Other Heritage Medical Research Groups gaining recognition for their work investigate: infectious diseases, aging, neurological diseases and injury, lipid metabolism (cholesterol), lung diseases, cell regulation, cell anatomy, and the genetics of cancer.

E
M

Dr. Bodh Jugdutt has found nitroglycerin and other drugs can reduce structural damage after a heart attack, lessening the chances of heart failure. By preserving the architecture of the heart, he believes some lives are saved.

When premature infants are too sick to be fed by mouth, they get their nutrition intravenously, but the intravenous emulsions they usually receive were designed for adults some 30 years ago. Dr. Johny Van Aerde has developed a method for producing special stable emulsions containing fatty acids and other nutrients the babies need to complete their development. He has found the new IV formula prevents a liver disease common to premature infants fed intravenously.

Scientific discovery is deceptive. Bite through the outer crust of logic and intelligence and you find patience, doggedness, and serendipity.

At the other end of life, Dr. Derek Griffiths' studies are improving the quality of life for old people. He has found that urinary incontinence is usually due to a defect in bladder control, not senility and that a standard drug treatment reduces the problem for some people.

Dr. Henry Duff is the first to show that the drug amiloride has anti-arrhythmic activity in animals and humans. His evidence indicates that two properties of the drug work together to regulate the harmful heart rhythms.

High blood pressure is called the "silent killer" because often it carries no symptoms. Half the people who have it, don't know it. For the majority of patients, the causes are unknown. Last year a U of A team identified what appears to be a new factor to account for about one quarter of all hypertension.

Using a new $3/4 million magnetic resonance facility, Dr. Hans Vogel has learned more about how plants produce natural cancer drugs, helped the forest industry identify which white spruce seedlings will grow faster, and explored the structure of a new form of DNA. Magnetic resonance is a technique which uses strong magnets and radiowaves to spin nuclei in atoms so scientists can study them.

The skin cancer known as malignant melanoma is very curable if caught in the early stages, but deadly if it isn't. Dr. Kowichi Jimbow has developed two laboratory techniques to detect the disease early. One uses antibodies unique to malignant melanoma cells to detect pre-malignant cells. The other is a blood or urine test based on the presence of a pigment produced by melanoma cells. Dr. Jimbow is working with industry to translate the techniques into a diagnostic kit for clinics.

E

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The U of C Dementia Clinic led by Dr. Irma Parhad is participating in two multicentre studies to get a handle on the dreaded Alzheimer's disease. A Canadian Health and Welfare Study focuses on disease prevalence, risk factors and the caregivers' burdens. Another study in 20 North American centres is testing the value of the drug Nimodipine which previous research suggests could alleviate brain cell damage by inhibiting calcium entry into the cells.

As group coordinator, Dr. Grant McFadden's reputation as a basic cancer researcher earned the U of A Faculty of Medicine one of the first Terry Fox Team Development Awards from the National Cancer Institute. The award funds three new scientists to develop a new cancer research group.

Dr. Freda Miller won the 1990 Cortical Explorer Award from the American Association of Anatomists. The award recognizes young scientists who have done outstanding research on the cerebral cortex.

Two protegés in Dr. Wolfgang Schneider's lab earned international awards for their studies of cholesterol biochemistry. Dr. Johannes Nimpf, a postdoctoral fellow, won the Young Investigator's Award at the International Atherosclerosis Congress. Graduate student Stefano Stifani won the Bristol Research Award for Young Scientists.

Foundation-funded scientists came up winners in the fierce competition for funding under the new $240 million federal Networks of Centres of Excellence Program. Researchers at the U of A and the U of C belong to five of the 14 centres and all 29 Albertans involved have received Foundation funding.

In medical research there are two kinds of excellence: the public kind recognized by peers with grants and awards and the quiet, courageous kind that only surfaces when conditions are favourable.

Albertans dominate the Bacterial Diseases Centre of Excellence with eight researchers, five of them Heritage Medical Scholars. Four other network members from B.C. and Ontario have been Foundation fellows. The Bacterial Diseases Group receives $18.4 million over four years and Alberta researchers get a fair share of the funds. The other major Alberta strength is in the Centre for Neuronal Regeneration and Functional Recovery which includes 12 Heritage Researchers.

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R

To be deaf is to be shut out of the hearing world most of the time. Lois Wood knows because she's been deaf since birth. She and her colleague Elaine Bell have become entrepreneurs so they can help the situation. They've founded Silent Communications Inc. to create a more portable and efficient telecommunications device for the deaf. The tiny computer translates telephone conversations into print on a screen. Silent Communications of Calgary received one of the first Phase III technology transfer grants, called the Alberta Medical Innovations Plan.

When science and business marry, science brings the dowry.

Innogenics Inc. is another new Alberta company based on Dr. Malcolm Paterson's study of an oncogene probe which can identify some women with stage I breast cancer who are at risk for early relapse. Financed by Vencap and the Alberta Cancer Board, Innogenics is a spin off of Dr. Paterson's $2 million research program on the genetics of cancer financed by the Foundation.

Dr. Robert Hodges, President of Synthetic Peptides Inc. has a basic licensing agreement with the University of Alberta to develop and test a vaccine for pseudomonas infection, a frequently fatal disease in cystic fibrosis patients.

Dr. John Remmers reports that Tranquility, his innovative sleeping mask for the sleep disorder called sleep apnea now has half of the North American market. As past recipients of Foundation Technology Transfer grants, Drs. Remmers and Hodges show that the program provides valuable support for the early stages of commercializing innovations.

Dr. Tony Schryvers' novel approach to a better meningitis vaccine has earned him a $320,000 Medical Research Council University/Industry Collaborative Research Grant from MRC and the Institut Merieux. He is one of over 40 Foundation-supported scientists who have research contracts with industry.

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Dr. Lucas exemplifies the bright, young physicians the Foundation sends abroad for specialized training to bring new clinical research expertise to Alberta. The future progress of medicine in Alberta greatly depends on such people because they are among those who can link basic lab studies to patient care and who will carry innovations to the marketplace.

We take a breath about 600 million times over a lifetime and each breath requires about 50 muscles. Dr. Paul Easton studies the muscle physiology of breathing to learn how critically ill patients with breathing problems can be helped. This year he initiated a study of the effectiveness of low oxygen therapy in Calgary long-term care patients.

Some of the experimental drugs used to control irregular heart rhythms that often lead to a heart attack are very harmful. This is one surprising findings of CAST, the $63 million international anti-arrhythmic drug trials run by the National Institutes of Health in the U.S. As one of the three Canadian centres in CAST, the U of C Calgary research team helped establish these findings.

These two studies on lung and heart function exemplify the direction medical research in Alberta and everywhere must take. We must evaluate the relative effectiveness and costs of old and new treatments. The slow progress of health care research in Alberta and elsewhere reflects the shortage of well-trained investigators and adequate support systems for this kind of research. Within the limits of its resources, the Foundation tackles the problem by sending physicians like Alexandra Lucas to prestigious labs abroad to acquire research expertise. She and others are conducting pockets of health care research and the Foundation is considering other strategies to support more studies.

Research advances are nothing but wind-flapping prize ribbons from a heady race unless they are used to tell us what we should and shouldn't do to heal the sick and stay healthy.

But it is only a tiny beginning, far from the scale and scope of research required, because these investigations are the most expensive kind, requiring many millions to mount a useful program. The Foundation will continue to foster and support health care research in cooperation with the universities and other health care providers, but of necessity, only on a limited basis unless more funds are received.

Dr. Bruce Stevenson is a young hotshot from Yale who did what other scientists said couldn't be done—he identified Z0-1, a protein component of a key mechanisms in cell-to-cell communication. Dr. John Elliott has returned to Alberta after making his reputation at Harvard (his team wrote three of the 100 most cited papers in one year). He uses his immunology expertise to search for an effective malaria vaccine. In the future the eye will be on these and the 19 other young scientists recruited this year because they are the lifeblood of a lively, productive research community.

EYE ON HEALTH

"I can walk," says Amy Mercer, a spunky five year-old from Camrose. She's making medical history while she does it. Amy and 11 year-old Peter McGregor are the world's first spinal-cord injured children to walk with electrical stimulation applied through surface electrodes. They receive the therapy in a special University of Alberta project run by Heritage Medical Visiting Professor from Yugoslavia, Dr. Dejan Popovic. The work is the latest development in the U of A research program which has successfully helped adult spinal-cord injured and stroke patients walk.

Scientific Advisory Council

The 12-member Scientific Advisory Council includes representatives from the national and international research communities. They review and advise the Foundation on major applications and policy decisions related to research. The members are:

DR. LIONEL E. McLEOD, President, Alberta Heritage Foundation for Medical Research (Till June 30, 1990)

DR. MATTHEW SPENCE, President, Alberta Heritage Foundation for Medical Research (Effective July 1, 1990)

DR. HAROLD L. ATWOOD, Professor and Chairman, Department of Physiology, University of Toronto, Toronto, Ontario

DR. JOHN BELL, Senior Lecturer, Institute of Molecular Medicine, John Radcliffe Hospital, Oxford, England

PROFESSOR H. JOHN EVANS, Director, MRC Clinical and Population Cytogenetics Unit, Western General Hospital, Edinburgh, Scotland

DR. WOLFGANG K. JOKLIK, Chairman, Department of Microbiology and Immunology, Duke University Medical Center, Durham, North Carolina

DR. LLOYD D. MACLEAN, Edward W. Archibald Professor, Chairman, Department of Surgery, McGill University, Montréal, Québec

DR. ANTONY H. MELCHER, Vice-Provost, University of Toronto, Toronto, Ontario

DR. I. BARRY PLESS, Professor of Pediatrics and Epidemiology, McGill University, Montréal, Québec

DR. DANIEL PORTE, JR., Associate Chief of Staff for Research and Development, Head, Division of Endocrinology and Metabolism, University of Washington, Seattle, Washington

DR. BISHNU D. SANWAL, Professor, Department of Biochemistry, The University of Western Ontario, London, Ontario

DR. RENE SIMARD, Vice-President Academic and Research, Université de Montréal, Montréal, Québec

DR. GARY L. STILES, Chief of Cardiology, Duke University Medical Center, Durham, North Carolina

Selecting the Scientists

Researchers funded by the Foundation are recruited in cooperation with university personnel. The applicant and a faculty or department head submits an application to the Foundation for peer review by internal and external reviewers. Then applications are reviewed by a Foundation advisory committee. The following people served on these committees.

DR. R. ANDERSON, Associate Professor, Faculty of Medicine (Microbiology & Infectious Diseases), U of C

DR. A. ANGEL, Professor and Director, Institute of Medical Science, U of T

DR. M. BENTLEY, Associate Professor, Faculty of Science (Biological Sciences), U of C

DR. Y. BERTHIAUME, Assistant Professor, Faculty of Medicine (Medicine), U of C

DR. J. BRUNTON, Assistant Professor, Faculty of Medicine, Mount Sinai University

DR. R. COUTTS, Professor, Faculty of Pharmacy, U of A

DR. A. FRENCH, Professor, Faculty of Medicine (Physiology), U of A

DR. W. GILES, Professor, Faculty of Medicine (Medicine & Medical Physiology), U of C

DR. J. HOGG, Professor, Faculty of Medicine (Pathology), UBC

DR. P. HOLLAND, Graduate Program Chairman, Montreal Neurological Institute

DR. F. JAMALI, Associate Professor, Faculty of Pharmacy, U of A

DR. S. JENSEN, Associate Professor, Faculty of Medicine (Microbiology), U of A

DR. C. KAY, Professor, Faculty of Medicine (Biochemistry), U of A

DR. B. KOLB, Professor, Faculty of Arts and Sciences (Psychology) U of L

DR. T. LOUIE, Professor, Faculty of Medicine (Microbiology & Infectious Diseases), U of C

DR. K. MacCANNELL, Professor, Faculty of Medicine (Pharmacology & Therapeutics), U of C

DR. G. McFADDEN, Professor, Faculty of Medicine (Biochemistry), U of A

DR. H. McLENNAN, Professor, Faculty of Medicine (Physiology), UBC

DR. R. MILLER, Senior Scientist, Ontario Cancer Institute

DR. R. MURPHY, Professor and Chairman, Faculty of Medicine (Anatomy & Cell Biology), U of A

DR. F. NARGANG, Associate Professor, Faculty of Science (Genetics), U of A

DR. S. NEWMAN, Associate Professor, Faculty of Medicine (Psychiatry), U of A

DR. M. PALCIC, Assistant Professor, Faculty of Agriculture & Forestry (Food Science), U of A

DR. A. PROCHAZKA, Professor, Faculty of Medicine (Neurosciences), U of A

DR. R. RAJOTTE, Professor, Faculty of Medicine (Surgery & Clinical Surgery), U of A

DR. J. RAYMOND, Associate Professor, Faculty of Social Sciences (Psychology), U of C

DR. R. REITHMEIER, Associate Professor, MRC Group in Membrane Biology, U of T

DR. O. RORSTAD, Professor, Faculty of Medicine (Medicine), U of C

DR. W. SCHNEIDER, Associate Professor, Faculty of Medicine (Biochemistry), U of A

DR. P. SCHNETKAMP, Assistant Professor, Faculty of Medicine (Medical Biochemistry), U of C

DR. B. SINGH, Professor and Acting Chairman, Faculty of Medicine (Immunology), U of A

DR. F. SNYDER, Associate Professor, Faculty of Medicine (Pediatrics) U of C

DR. D. TAYLOR, Professor, Faculty of Medicine (Medical Microbiology & Infectious Diseases) U of A

DR. H. TER KEURS, Professor, Faculty of Medicine (Medicine & Medical Physiology), U of C

DR. G. WARNOCK, Associate Professor, Faculty of Medicine (Surgery), U of A

DR. J. WRIGHT, Associate Director, Manitoba Institute of Cell Biology, U of M

Personnel

(as of March 31, 1990)

Heritage Medical Scientists

ALLEN, Peter, Ph.D., Department of Applied Sciences in Medicine, Faculty of Medicine, University of Alberta "Imaging and Biochemical Applications of NMR to Medicine"

BRINDLEY, David, Ph.D., Department of Biochemistry, Faculty of Medicine, University of Alberta "Control of Glycerolipid and Lipoprotein Metabolism"

GILES, Wayne, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Electrophysiology - Pharmacology of Cardiac Cells"

GRIFFITHS, Derek, Ph.D., Department of Applied Sciences in Medicine, Faculty of Medicine, University of Alberta "Urodynamics"

HULLIGER, Manuel, Ph.D., Departments of Clinical Neurosciences and Medical Physiology, Faculty of Medicine, University of Calgary "Peripheral Control of Voluntary Movement"

JIMBOW, Kowichi, M.D., Ph.D., Department of Medicine, Faculty of Medicine, University of Alberta "Melanogenesis and Laboratory Diagnosis and Rational Therapy of Malignant Melanoma"

JUGDUTT, Bodh, M.D., Department of Medicine, Faculty of Medicine, University of Alberta "Modification of Ventricular Shape and Function During Healing After Myocardial Infarction"

MARTIN, Renee, Ph.D., Department of Pediatrics, Faculty of Medicine, University of Calgary "Cytogenetic Analysis of Human Sperm"

McGHEE, James, Ph.D., Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "Gene Expression During Animal Development"

PATERSON, Malcolm, Ph.D., Department of Medicine, Cross Cancer Institute "Clinical Genetics and Molecular Carcinogenesis"

PAUL, Leendert, M.D., Ph.D., Department of Medicine, Faculty of Medicine, University of Calgary "Organ Transplant: Program of Clinical and Experimental Research"

RABINOVITCH, Alexander, M.D., Department of Medicine, Faculty of Medicine, University of Alberta "Immunobiology of Diabetes Mellitus"

REMMERS, John, M.D., Department of Medicine, Faculty of Medicine, University of Calgary "Control of Breathing by the Nervous System"

SINGH, Bhagirath, Ph.D., Department of Immunology, Faculty of Medicine, University of Alberta "Mechanism and Regulation of Antigen Recognition by T-Lymphocytes"

TER KEURS, Henk, M.D., Ph.D., Departments of Medicine and Medical Physiology, Faculty of Medicine, University of Calgary "Activation and Contraction of the Heart"

TYBERG, John, M.D., Ph.D., Departments of Medicine and Medical Physiology, Faculty of Medicine, University of Calgary "Cardiac Mechanics: Factors Affecting the Heart's Pumping Action"

VANCE, Dennis, Ph.D., Department of Biochemistry, Faculty of Medicine, University of Alberta "Phospholipid and Lipoprotein Metabolism"

WANG, Jerry, Ph.D., Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "Studies in Cell Regulation"

YOON, Ji-Won, Ph.D., Department of Microbiology and Infectious Diseases, Faculty of Medicine, University of Calgary "Two Possible Mechanisms for the Pathogenesis of Virus-Induced Diabetes Mellitus"

Heritage Medical Scholars

ACHESON, Ann, Ph.D., Department of Anatomy and Cell Biology, Faculty of Medicine, University of Alberta "Role of Cell Adhesion in Neurotransmitter Phenotypic Expression"

ANDERSON, M. John, Ph.D., Department of Pharmacology and Therapeutics, Faculty of Medicine, University of Calgary "Development of the Neuromuscular Junction"

ANDERSON, Robert, Ph.D., Department of Microbiology and Infectious Diseases, Faculty of Medicine, University of Calgary "Control of Virus Synthesis and Assembly"

AUER, Roland, Ph.D., M.D., Department of Pathology, Faculty of Medicine, Faculty of Medicine, University of Calgary "Neuronal Death in Ischemia, Hypoglycemia, and Epilepsy"

* **BARNES**, Steven, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Mechanisms of Synaptic Interaction Among Photoreceptors of the Vertebrate Retina"

BAZETT-JONES, David, Ph.D., Departments of Anatomy and Medical Biochemistry, Faculty of Medicine, University of Calgary "Ultrastructure of Transcription Complexes"

BEFUS, Dean, Ph.D., Department of Microbiology and Infectious Diseases, Faculty of Medicine, University of Calgary "Studies of Intestinal Immunity and Mast Cells"

BENISHIN, Christina, Ph.D., Department of Physiology, Faculty of Medicine, University of Alberta "Presynaptic Modulation of Potassium Channels"

BERDAN, Robert, Ph.D., Department of Physiology, Faculty of Medicine, University of Alberta "Formation and Function of Electrical Synapses"

BLEACKLEY, Robert, Ph.D., Department of Biochemistry, Faculty of Medicine, University of Alberta "Molecular Genetics of T-Cell Differentiation"

BOISVERT, Donald, Ph.D., M.D., Department of Surgery, Faculty of Medicine, University of Alberta "Pathophysiology and Therapy of Cerebrovascular Occlusion"

BOWLING, Douglas, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Projections of Single Identified Retinal Axons"

BULLOCH, Andrew, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Cellular Basis of Adult Neuronal Plasticity"

CAMPENOT, Robert, Ph.D., Department of Anatomy and Cell Biology, Faculty of Medicine, University of Alberta "Control of Nerve Fiber Growth and Survival by Ions, Pharmacological Agents and Electrical Activity"

CLANDININ, Michael, Ph.D., Departments of Foods and Nutrition and Medicine, Faculties of Home Economics and Medicine, University of Alberta "Nutrition and Metabolism of Dietary Fat"

CODDING, Penelope, Ph.D., Departments of Chemistry and Pharmacology and Therapeutics, Faculties of Science and Medicine, University of Calgary "Molecular Structure and Function Studies of CNS Active Drugs and Toxins"

COLMERS, William, Ph.D., Department of Pharmacology, Faculty of Medicine, University of Alberta "Neuromodulation in CNS"

DAY III, Rufus, Ph.D., Department of Medicine, Cross Cancer Institute "DNA Repair and Gene Regulation in Human Tumor Systems"

DUFF, Henry, M.D., Department of Medicine, Faculty of Medicine, University of Calgary "Mechanistic Approach to Antiarrhythmic Therapy"

* **DUNN**, Susan, Ph.D., Department of Pharmacology, Faculty of Medicine, University of Alberta "Mechanisms of GABAergic Neurotransmission"

EASTON, Paul, M.D., Department of Medicine, Faculty of Medicine, University of Calgary "Hypoxia, Respiratory Muscles and Ventilatory Control"

* **EDWARDS**, Dylan, Ph.D., Department of Pharmacology and Therapeutics, Faculty of Medicine, University of Calgary "Growth Factor Control of Gene Regulation"

EGGERMONT, Jos, Ph.D., Department of Psychology, Faculty of Social Sciences, University of Calgary "Functional Plasticity of the Auditory Nervous System"

* **ELLIOTT**, John, M.D., Ph.D., Department of Microbiology and Infectious Diseases, Faculty of Medicine, University of Alberta "Cloning of Genes for Malaria Surface Antigens by Eucaryotic Expression"

FAMIGLIETTI, Edward, M.D., Ph.D., Department of Anatomy, Faculty of Medicine, University of Calgary "Functional Architecture of Vertebrate Retina"

FEWELL, James, Ph.D., Departments of Obstetrics and Gynecology and Medical Physiology, Faculty of Medicine, University of Calgary "Cardio-respiratory Control During Sleep"

FIELD, L. Leigh, Ph.D., Department of Pediatrics, Faculty of Medicine, University of Calgary "The Genetics of Susceptibility to Insulin-Dependent Diabetes"

* New Scholar 1989-90

FINEGOOD, Diane, Ph.D., Departments of Medicine and Physiology, Faculty of Medicine, University of Alberta "Hepatic Insulin Action and Insulin Resistance"

FOTEDAR, Arun, Ph.D., M.D., Department of Immunology, Faculty of Medicine, University of Alberta "T-Cell Recognition"

FRANK, Cyril, M.D., Ph.D., Department of Surgery, Faculty of Medicine, University of Calgary "Connective Tissue Structure and Function"

FRENCH, Robert, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Ionic Channels in Excitable Membranes"

FRITZLER, Marvin, Ph.D., M.D., Departments of Medicine and Medical Biochemistry, Faculty of Medicine, University of Calgary "Antinuclear Antibodies in Autoimmune Diseases"

FUJITA, Donald, Ph.D., Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "Control of Oncogene Activity"

GALLIN, Warren, Ph.D., Department of Zoology, Faculty of Science, University of Alberta "Cellular Mechanisms of Development"

GARBER, Anthony, Ph.D., Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "The Molecular Biology of Psoriasis"

GELLMAN, Reuben, Ph.D., Departments of Clinical Neurosciences and Medical Physiology, Faculty of Medicine, University of Calgary "Processing of Oculomotor Signals in the Cerebellum"

GODBOUT, Roseline, Ph.D., Department of Anatomy & Cell Biology, Faculty of Medicine, University of Alberta "Molecular Genetics of Retinal Development"

GORDON, Tessa, Ph.D., Department of Pharmacology, Faculty of Medicine, University of Alberta "Neuromuscular Plasticity"

GREEN, Douglas, Ph.D., Department of Immunology, Faculty of Medicine, University of Alberta "Immunoregulatory T-Cells and Molecules"

GREEN, Francis, M.D., Ph.D., Department of Pathology, Faculty of Medicine, University of Calgary "Mechanisms of Lung Injury by Environmental Agents"

GREENSHAW, Andrew, Ph.D., Department of Psychiatry, Faculty of Medicine, University of Alberta "Beta-Phenylethylamine, p-Tyramine and p-Octopamine and the Treatment of Affective Disorders"

HART, David, Ph.D., Departments of Medicine and Microbiology and Infectious Diseases, Faculty of Medicine, University of Calgary "Immunochemical Characterization of Plasminogen Activators"

*** HAYNES**, Lawrence, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Properties of the cGMP-gated Channel of Vertebrate Rods and Cones"

HOFFER, J. Andy, Ph.D., Departments of Medical Physiology and Clinical Neurosciences, Faculty of Medicine, University of Calgary "Neural Control of Movements"

HULBERT, William, Ph.D., Department of Medicine, Faculty of Medicine, University of Alberta "The Effect of H_2S on Airway Structure and Function"

IATROU, Kostas, Ph.D., Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "The Organization, Expression and Evolution of Eukaryotic Multigene Families in Chorion of ***Bombyx Mori***"

JACOBS (KAUFMAN), Susan, Ph.D., Department of Medicine, Faculty of Medicine, University of Alberta "Control Mechanisms of Fluid and Electrolyte Balance"

JENSEN, Susan, Ph.D., Department of Medical Microbiology and Infectious Diseases, Faculty of Science, University of Alberta "Biosynthesis of Novel Penicillin and Cephalosporin Antibiotics"

KING, Malcolm, Ph.D., Department of Medicine, Faculty of Medicine, University of Alberta "Studies on Mucus Clearance"

KOOPMANS, Henry, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "The Internal Control of Food Intake"

LAFRENIERE, Rene, M.D., Department of Surgery, Faculty of Medicine, University of Calgary "Adoptive Immunotherapy of Tumors with Activated Lymphocytes and Biological Response Modifiers"

LAU, David, M.D., Ph.D., Department of Medicine, Faculty of Medicine, University of Calgary "Regulation of Adipose Tissue Development and Growth"

LEE, Patrick, Ph.D., Department of Microbiology and Infectious Diseases, Faculty of Medicine, University of Calgary "The Mechanism of Virus Attachment of Host Cells"

LEE, Timothy, Ph.D., Department of Microbiology and Infectious Diseases, Faculty of Medicine, University of Calgary "Protective Immunity of Nematode Infection"

* **LOPASCHUK**, Gary, Ph.D., Department of Pediatrics and Pharmacology, Faculty of Medicine, University of Alberta "Fatty Acid Metabolism in the Heart"

MacVICAR, Brian, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Neuronal Basis for Synchrony During Seizure"

* **MAINS**, Paul, Ph.D., Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "Molecular and Genetic Analysis of *C. elegans* Embryogenesis"

MANTLE, Michele, Ph.D., Departments of Medical Biochemistry and Pediatrics, Faculty of Medicine, University of Calgary "Structure, Synthesis and Secretion of Intestinal Mucus"

MARTIN-IVERSON, Mathew, Ph.D., Department of Psychiatry, Faculty of Medicine, University of Alberta "Behavioral Functions of Dopamine Receptor Subtypes: Animal Models of Schizophrenia, Parkinson's Disease and Stimulant Addiction"

McFADDEN, Grant, Ph.D., Department of Biochemistry, Faculty of Medicine, University of Alberta "Molecular Biology of Tumorogenic Shope Fibroma Poxviruses"

MICHALAK, Marek, Ph.D., Departments of Pediatrics and Biochemistry, Faculty of Medicine, University of Alberta "Ca Transport Systems in Mature and Developing Heart"

MILLER, Freda, Ph.D., Department of Anatomy and Cell Biology, Faculty of Medicine, University of Alberta "Molecular Analysis of Neuronal Development"

MITCHELL, L. Brent, M.D., Department of Medicine, Faculty of Medicine, University of Calgary "Prophylactic Therapy for Ventricular Tachyarrhythmias"

MOORE, Graham, Ph.D., Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "The Synthesis and Evaluation of Peptide Hormones and Analogues"

NEWMAN, Stephen, M.D., Department of Psychiatry, Faculty of Medicine, University of Alberta "Mortality of Affective Disorder Patients in Alberta"

PARHAD, Irma, M.D., Departments of Pathology and Clinical Neurosciences, Faculty of Medicine, University of Calgary "Neurofibrillary Degeneration: Pathogenic Mechanisms"

PITTMAN, Quentin, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Peptide Neurotransmission in Brain"

PREIKSAITIS, Jutta, M.D., Departments of Medicine and Medical Microbiology and Infectious Diseases, Faculty of Medicine, University of Alberta "Transfusion Acquired Cytomegalovirus Infection: Epidemiology and Immune Response in Man"

PROCHAZKA, Arthur, Ph.D., Department of Physiology, Faculty of Medicine, University of Alberta "Neural Control of Mammalian Movement"

RATTNER, Jerome, Ph.D., Departments of Medical Biochemistry and Anatomy, Faculty of Medicine, University of Calgary "High Order Structure of Chromosomes"

READ, Randy, Ph.D., Department of Medical Microbiology and Infectious Diseases, Faculty of Medicine, University of Alberta "Protein Crystallography and Rational Design of Trypanocidal Drugs"

REHA-KRANTZ, Linda, Ph.D., Department of Genetics, Faculty of Science, University of Alberta "The Biochemical Basis of Mutation"

REYNOLDS, John, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Studies of the Intestinal Immune System"

RORSTAD, Otto, M.D., Ph.D., Department of Medicine, Faculty of Medicine, University of Calgary "Mechanisms of Action of Brain Peptides"

RYAN, Robert, Ph.D., Department of Biochemistry, Faculty of Medicine, University of Alberta "Hormone-Induced Diacylglycerol Transport and Metabolism"

SCHNEIDER, Wolfgang, Ph.D., Department of Biochemistry, Faculty of Medicine, University of Alberta "Receptor-Mediated Endocytosis in Oocytes"

SCHNETKAMP, Paul, Ph.D., Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "Visual Transduction in Rod Photoreceptors"

* **SCHRYVERS**, Anthony, Ph.D., M.D., Department of Microbiology and Infectious Diseases, Faculty of Medicine, University of Calgary "The Receptors for Human Transferrin and Lactoferrin in *Neisseria meningitidis*"

SCHURCH, Samuel, Ph.D., Departments of Medicine and Medical Physiology, Faculty of Medicine, University of Calgary "Lung Stability and Cell Adhesion"

SEVERSON, David, Ph.D., Department of Pharmacology and Therapeutics, Faculty of Medicine, University of Calgary "Lipid Metabolism in Heart and Blood Vessels"

* **SIMINOSKI**, Kerry, M.D., Department of Medicine, Faculty of Medicine, University of Alberta "Regulation of Nerve Growth Factor Activity"

SMITH, Peter, Ph.D., Department of Pharmacology, Faculty of Medicine, University of Alberta "Electrophysiological Studies of the Electrogenic Sodium Pump in Sympathetic Ganglia and Spinal Cord"

SNYDER, Floyd, Ph.D., Departments of Medical Biochemistry and Pediatrics, Faculty of Medicine, University of Calgary "Studies of Inherited Disorders of Nucleotide Metabolism"

SOKOL, Pamela, Ph.D., Department of Microbiology and Infectious Diseases, Faculty of Medicine, University of Calgary "Role of Iron in the Pathology of *Pseudomonas* Infection"

* **STEVENSON**, Bruce, Ph.D., Department of Anatomy and Cell Biology, Faculty of Medicine, University of Alberta "Molecular Dynamics of ZO-1 and the Light Junction"

STOCKBRIDGE, Norman, M.D., Ph.D., Department of Surgery, Faculty of Medicine, University of Alberta "Signal Processing by Neurons"

TAYLOR, Diane, Ph.D., Department of Medical Microbiology and Infectious Diseases, Faculty of Medicine, University of Alberta "Characterization of Bacterial Plasmids"

VOGEL, Hans, Ph.D., Department of Biochemistry and Biological Sciences, Faculty of Science, University of Calgary "NMR Studies of Mechanistic and Regulatory Aspects of Metabolism"

WAISMAN, David, Ph.D., Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "Studies of Calcium Binding Proteins"

* **WALLACE**, John, Ph.D., Department of Medical Physiology, Faculty of Medicine, University of Calgary "Endogenous Mediators of Gastrointestinal Pathophysiology"

WALSH, Michael, Ph.D., Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "Enzyme Regulation by Calcium"

WENMAN, Wanda, M.D., Department of Pediatrics, Faculty of Medicine, University of Alberta "Human Infections with *Chlamydia Trachomatis*"

WITKOWSKI, Francis, M.D., Department of Medicine, Faculty of Medicine, University of Alberta "Autonomic Neural Influences in Arrhythmogenesis"

WONG, Norman, M.D., Department of Medicine, Faculty of Medicine, University of Calgary "Mechanism of Thyroid Hormone Action"

WONG, Sui-Lam, Ph.D., Department of Biological Sciences, Faculty of Science, University of Calgary "Gene Regulation and Secretion in *Bacillus Subtilis*"

WOODS, Donald, Ph.D., Department of Microbiology & Infectious Diseases, Faculty of Medicine, University of Calgary "Pathogenesis of *Pseudomonas Aeruginosa* Disease"

WYSE, George, Ph.D., M.D., Departments of Medicine and Pharmacology and Therapeutics, Faculty of Medicine, University of Calgary "Investigations in Hypertension and Electrophysiology"

YOKOYAMA, Shinji, M.D., Ph.D., Department of Medicine, Faculty of Medicine, University of Alberta "Mechanism of Reverse Cholesterol Transport"

* **ZACKSON**, Saul, Ph.D., Department of Medical Biochemistry, Faculty of Medicine, University of Calgary "Cellular and Molecular Analysis of a Morphogenetic Cell Migration"

ZWIERS, Hindrik, Ph.D., Departments of Medical Physiology and Medical Biochemistry, Faculty of Medicine, University of Calgary "Neuropeptides, Phosphoproteins, and Neural Plasticity"

Heritage Clinical Investigators

BERTHIAUME, Yves, M.D., Department of Medicine, Faculty of Medicine, University of Calgary "Mechanisms of Alveolar Liquid Clearance"

* **BUTZNER**, J. Decker, M.D., Department of Pediatrics, Faculty of Medicine, University of Calgary "Chronic Protein-Calorie Malnutrition in the Developing Infant: Alterations in Intestinal Mucosal Development, Function and Repair"

* **CHIK**, Constance, M.D., Ph.D., Department of Medicine, Faculty of Medicine, University of Alberta "The Pineal Gland: a Model for Ethanol Action on Neuroendocrine Function"

COE, James, M.D., Department of Pediatrics, Faculty of Medicine, University of Alberta "Pharmacological Manipulation of the Neonatal Circulation"

FEDORAK, Richard, M.D., Department of Medicine, Faculty of Medicine, University of Alberta "Adaptation and Regulation of Intestinal Glucose Transport"

FLETCHER, William, M.D., Department of Clinical Neurosciences, Faculty of Medicine, University of Calgary "Visual Motor Dysfunction with Frontal Lobe Lesions"

GILL, M. John, M.D., Departments of Microbiology and Infectious Diseases and Medicine, Faculty of Medicine, University of Calgary "Investigations of Viral Pathogenesis"

GILLIS, Anne, M.D., Department of Medicine, Faculty of Medicine, University of Calgary "Myocardial Kinetics and Pharmacodynamics"

* **GRUNDY**, Paul E., M.D., Department of Molecular Genetics and Carcinogenesis Laboratory, Cross Cancer Institute "Molecular Genetics of Wilms' Tumor"

HO, May, M.D., Department of Microbiology and Infectious Diseases, Faculty of Medicine, University of Calgary "Immunoregulation in *P. Falciparum* Malaria"

KNETEMAN, Norman, M.D., Department of Surgery, Faculty of Medicine, University of Alberta "Islet Isolation, Immunomodulation and Immunosuppression"

KUNIMOTO, Dennis, M.D., Department of Medical Microbiology and Infectious Diseases, Faculty of Medicine, University of Alberta "IgA Regulation"

* **LEE**, B. Craig, M.D., Department of Microbiology and Infectious Diseases, Faculty of Medicine, University of Calgary "The Role of Iron Acquisition in the Pathogenesis of Gonococcal Infection"

LEE, Samuel, M.D., Department of Internal Medicine, Faculty of Medicine, University of Calgary "Pathophysiology of Portal Hypertension"

LIEN, Dale, M.D., Department of Medicine, Faculty of Medicine, University of Alberta "Neutrophils in Airway Inflammation"

* **LUCAS**, Alexandra R., M.D., Department of Medicine, Faculty of Medicine, University of Alberta "Spectroscopic Investigation of Atherosclerotic Plaque Development"

MACLEAN, Grant, M.D., Department of Medicine, Faculty of Medicine, University of Alberta "Monoclonal Antibodies in Small Cell Lung Cancer"

MEDDINGS, Jonathan, M.D., Department of Medicine, Faculty of Medicine, University of Calgary "Physiology of Intestinal Permeability"

* **MODY**, Christopher H., M.D., Department of Medicine, Faculty of Medicine, University of Calgary "Antimicrobial Defense Mechanisms of the Lung in CD 4 (T-Helper/Inducer) Cell Deficiency"

PARFREY, Nollaig, M.D., Department of Pathology, Faculty of Medicine, University of Alberta "Immune Mechanisms in Self Tolerance and Autoimmunity"

RYAN, Edmond, M.D., Department of Medicine, Faculty of Medicine, University of Alberta "Insulin Resistance in Pregnancy"

SCOTT, R. Brent, M.D., Department of Pediatrics, Faculty of Medicine, University of Calgary "Gastrointestinal Motor Function"

TRANMER, Bruce, M.D., Department of Clinical Neurosciences, Faculty of Medicine, University of Calgary "The Role of Hypervolemic Hemodilution During Cerebral Ischemia"

TREDGET, Edward, M.D., Department of Surgery, Faculty of Medicine, University of Alberta "Collagen Metabolism *In Vivo*"

VAN AERDE, Johny, M.D., Department of Pediatrics, Faculty of Medicine, University of Alberta "Fat Utilization in Parenterally Fed Newborn Infants"

WARNOCK, Garth, M.D., Department of Surgery, Faculty of Medicine, University of Alberta "Transplantation of Human Islets of Langerhans"

* **WATSON**, Timothy W., M.D., Ph.D., Department of Clinical Neurosciences, Faculty of Medicine, University of Calgary "Somatostatin Actions in the *In Vitro* Striatal Slice"

Programs of the Foundation

Heritage Medical Scientist Awards

This award encourages the recruitment and establishment of senior medical scientists to Alberta. Heritage Medical Scientists are leaders in their fields and are internationally recognized for their scientific contributions. The award is for five years and renewable.

Scholarships

Heritage Medical Scholars are investigators recently trained in medical research who have demonstrated promise and ability to initiate and conduct independent research. A five-year, renewable Scholarship allows scientists to develop medical research unhampered by heavy teaching and service duties.

Clinical Investigatorships

Clinical Investigatorships give clinically qualified medical scientists holding full-time academic appointments further research training and experience assisted by competitively-funded basic or clinical researchers. Clinical investigators must have an M.D. or D.D.S., have completed clinical specialty training and two or three years of supervised medical research. The three-year award may be extended for three years but is not renewable.

Independent Establishment Grants for New Investigators

Independent Establishment Grants are given to new investigators who are not funded by the Foundation. The grant helps them quickly achieve maximal research productivity by providing equipment, technical assistance, and materials.

Fellowships

Heritage Medical Research Fellowships provide qualified candidates with full-time postdoctoral training in research in an area of medical science relevant to the aims of the Foundation. Fellows must have an M.D., D.D.S., D.V.M., Ph.D., and must demonstrate high academic standing and evidence of research ability.

Clinical Fellowships

Clinical Fellowships give individuals who have completed clinical training an opportunity to gain supervised medical research experience. Applicants must have a medical or dental degree and have completed subspecialty clinical training. The one-year award may be renewed three times.

Studentships

There are a limited number of full-time Studentships for students registered in full-time M.Sc. or Ph.D. programs, and who plan careers in medical research. A limited number of part-time Studentships are available to students working towards professional health-related degrees. Summer Studentship awards support promising Alberta University students from May to August.

Technology Transfer Grants

The Technology Transfer Program provides an opportunity for Alberta medical researchers or engineers to promote university/industrial collaboration in Alberta, stimulate technological innovation in Alberta, and advance medical research to the stage where private investors may provide seed capital.

Phase I grants enable applicants to strengthen the technical merit and explore the feasibility of a scientifically sound project. Phase II grants apply when a product or technique has been identified and laboratory tested but requires further investigation and refinement to attract seed/venture capital. Phase III grants come under the new Alberta Medical Innovations Plan funded by federal transfer grants of $9.3 million over four years. Grants of up to $500,000 fund prototype development, market research, development of production methods, start up manufacturing and clinical trials.

Visiting Scientists

Awards for Visiting Scientists to Alberta enable a limited number of highly innovative and productive medical scientists to engage in medical research in an Alberta university for the purpose of bringing special knowledge and expertise to the host department, group, or institution.

Awards for Visiting Scientists from Alberta enable Albertans to undertake collaborative research that they are unable to undertake locally due to inadequate technology or collegial expertise.

Conference Grants

The Foundation supports a limited number of conference and workshops clearly related to the enhancement of medical research in Alberta and the transmission of significant new knowledge to those who care for patients.

Visiting Lecturers

The Visiting Lecturer program helps Alberta universities attract outstanding medical scientists who can broaden and enrich the educational experience of graduate students and fellows. The program also gives Alberta investigators opportunities to discuss their research with others in their field.

Travel Grants

The Foundation annually gives Travel Grants to the U of A and the U of C to be administered by the Universities to faculty for: attending workshops, conferences, and annual meetings; recruiting researchers; briefly visiting other laboratories to study new techniques or discuss collaborations.

Visiting Professors

Heritage Medical Research Visiting Professorships are available to attract truly outstanding medical scientists to visit Alberta to enrich and enhance the climate of medical research.

Grants for Major Equipment

Major Equipment grants and equipment maintenance funds permit the university on behalf of investigators to purchase and maintain equipment essential to high-quality research. Applications usually relate directly to research projects supported by competitive granting agencies.

Preference is given to expensive facilities providing support to groups of researchers and multidisciplinary projects, especially those facilities offering services to researchers with partial or full recovery arrangement for operating costs.

Institutional Grants

Institutional Grants to the Universities cover some of the costs associated with an influx of AHFMR scientists and include items such as renovations, recruiting costs, support staff, library grants, and special initiative grants.

Statistics

Table 1: New Grants and Awards Implemented For The 1989-90 Awards Year

*Number and Value of Grants and Awards**

Award Category	U of A	U of C	Others	Totals
Studentship				
- Full-Time	$ 412,322 (35)	$ 281,242 (28)	$ ---	$ 693,564 (63)[1]
- Part-Time	9,000 (3)	---	---	9,000 (3)
- Summer	408,000 (111)	144,000 (36)	---	552,000 (147)
Fellowship				
- Full-Time	346,563 (12)	289,942 (16)	30,938 (5)	667,443 (33)[1]
- Part-Time	---	---	---	---
Clinical Fellowship	98,030 (3)	52,885 (2)	179,440 (4)	330,355 (9)[1]
Clinical Investigatorship/ + Establishment Grant	403,350 (2)	453,000 (4)	151,833 (1)[2]	1,008,183 (7)
Clinical Traineeship	---	---	---	---
Scholarship/Establishment + Grant	1,109,600 (4)	1,397,680 (6)	---	2,507,280 (10)
Heritage Medical Scientist/ ** Establishment Grant	--- (2)	--- (1)	---	--- (3)
Independent Establishment Grant	769,869 (3)	147,000 (1)	---	916,869 (4)
Major Equipment Grant	386,991 (8)	174,378 (7)	---	561,369 (15)
Conference Grant	45,500 (9)	22,350 (7)	9,261 (3)	77,111 (19)
Technology Transfer Grant				
- Phase I	---	25,000 (1)	25,000 (1)	50,000 (2)
- Phase II	140,880 (2)	145,000 (2)	---	285,880 (4)
Visiting Scientist				
- To Alberta	4,700 (1)	4,600 (1)	---	9,300 (2)
- From Alberta	---	---	---	---
Visiting Professor	2,100 (3)	4,600 (4)	1,700 (1)	8,400 (8)
TOTALS	**$4,136,905 (198)**	**$3,141,677 (116)**	**$398,172 (15)**	**$ 7,676,754 (329)**

Notes:

*** - Values shown are committed amounts.**

**** - Establishment grants not provided for Heritage Scientist awards; previously supported as Scholars**

+ - Values shown are committed amounts for approved Establishment Grants only.

1 - Includes Research Allowance for Full-Time Studentship, Full-Time Fellowship and Clinical Fellowship awards.

2 - Cross Cancer Institute awards

Table 2: Summary of Applications Received and Processed During the 1989-90 Award Year

Number of Applications Processed

Award Category	U of A Total	A	R	O	U of C Total	A	R	O	Others Total	A	R	O	Totals Total	A	R	O
Studentship																
- Full-Time	81	38	43	0	77	33	43	1	0	0	0	0	158	71	86	1
- Part-Time	2	2	0	0	0	0	0	0	0	0	0	0	2	2	0	0
- Summer	152	101	50	1	102	49	51	2	2	0	0	2	256	150	101	5
Fellowship																
- Full-Time	59	17	41	1	52	17	33	2	17	7	10	0	128	41	84	3
- Part-Time	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1	0
- Dental	1	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Clinical Fellowship	6	1	4	1	6	1	4	1	5	2	3	0	17	4	11	2
Clinical Investigatorship/ Establishment Grant	5	2	0	3	4	0	0	4	0	0	0	0	9	2	0	7
Scholarship/Establishment Grant	6	3	1	2	10	2	3	5	0	0	0	0	16	5	4	7
Heritage Medical Scientist/ Establishment Grant	3	2	0	1	4	2	1	1	0	0	0	0	7	4	1	2
Independent Establishment Grant	11	0	1	10	6	2	1	3	1	0	1	0	18	2	3	13
Major Equipment Grant	19	7	12	0	6	0	6	0	1	0	1	0	26	7	19	0
Conference Grant	11	9	2	0	9	7	2	0	3	3	0	0	23	19	4	0
Technology Transfer Grant Phase I	2	0	2	0	5	3	2	0	5	0	3	2	12	3	7	2
Technology Transfer Grant Phase II	7	1	6	0	3	2	1	0	6	2	4	0	16	5	11	0
Visiting Scientist																
- To Alberta	1	1	0	0	4	1	3	0	0	0	0	0	5	2	3	0
- From Alberta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Visiting Professor	1	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0
TOTALS	**367**	**186**	**162**	**19**	**289**	**119**	**151**	**19**	**40**	**14**	**22**	**4**	**696**	**319**	**335**	**42**

A = Approved R = Rejected O = Withdrawn/Pending

Table 3: Grants and Awards Renewed/Continued - 1989/90

Award Category	U of A Total	U of C Total	Others Total	Totals
Studentship				
- Full-Time	65	51	0	116
- Part-Time	1	0	0	1
Fellowship				
- Full-Time	24	33	14	71
- Part-Time	0	0	0	0
Independent Research Allow.				
- Student	4	1	0	5
- Fellow	0	2	0	2
Clinical Fellowship	4	3	6	13
Clinical Investigatorship /Establishment Grant	11	9	0	20
Scholarship/Establishment Grant	37*	55**	2	94
Heritage Medical Scientist /Establishment Grant	6	9	1	16
TOTALS	**152**	**163**	**23**	**338**

*** (1) Scholar supported for 3 months only; (1) Scholar supported for 10 months only**

**** (1) Scholar supported for 1 month only; (1) Scholar supported for 3 months only; (1) Scholar supported for 5 months only; (1) Scholar supported for 6 months only**

Table 4: Total Awards Active on March 31, 1990

Award Category	U of A Total	U of C Total	Others Total	Totals
Clinical Investigatorship /Establishment Grant	13	13	1	27
Heritage Medical Scientist /Establishment Grant	8	10	1	19
Heritage Scholarship /Establishment Grant	40	58	2	100
TOTALS	**61**	**81**	**4 ***	**146**

* Cross Cancer Institute Awards

AHFMR Expenditures 1989-90	$ Millions	%
Research Support Costs and Institutional Grants to Universities**	7.3	21.8
Scholarship/Heritage Medical Scientist Awards, Clinical Investigators, Establishment Grants	14.0	41.8
Fellowship Awards and Research Allowances	3.9	11.6
Studentship Awards and Research Allowances	2.8	8.4
Major Equipment Grants and Maintenance (excluding Establishment Grants)	1.4	4.2
General Research Grants*	2.4	7.2
Administrative Costs	1.3	3.9
Technology Transfer Grants	.3	.9
Scientific Policy and Evaluation Costs	.1	.2
	$33.5	**100.0%**

* **Conference Grants, Visiting Scientists, Visiting Lecturers and Faculty Travel, Independent Establishment Grants. Independent Research Allowances, Special Initiative Funding. Visiting Professorships and Clinical Traineeships.**

** **Includes institutional grants for construction of new buildings.**

*** **Excludes Medical Innovation Program.**

ALBERTA HERITAGE FOUNDATION FOR MEDICAL RESEARCH

Financial Statements

March 31, 1990

Auditor's Report

To the Trustees of the Alberta Heritage Foundation for Medical Research

I have examined the balance sheet of the Alberta Heritage Foundation for Medical Research as at March 31, 1990 and the statements of revenue and expenditure - operating, revenue surplus - operating and revenue, expenditure and unexpended funds - Medical Innovation Program for the year then ended. My examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as I considered necessary in the circumstances.

In my opinion, these financial statements present fairly the financial position of the Foundation as at March 31, 1990 and the results of its operations and the changes in its financial position for the year then ended in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Donald D. Salmon

FCA
Auditor General

Edmonton, Alberta
July 27, 1990

ALBERTA HERITAGE FOUNDATION FOR MEDICAL RESEARCH

Balance Sheet
March 31, 1990

	1990	1989
Assets		
Cash	$7,764,986	$5,669,641
Accounts receivable	86,521	112,055
Advances and prepaid expenses (Note 4)	537,494	488,880
Mortgages receivable from research scientists	376,243	504,261
Fixed assets (Note 5)	112,245	138,480
	$8,877,489	**$6,913,317**
Liabilities, Surplus and Unexpended Funds		
Accounts payable	$4,566,898	$1,763,876
Revenue surplus	926,637	5,149,441
Medical Innovation Program - unexpended funds (Note 6)	3,383,954	—
	$8,877,489	**$6,913,317**

The accompanying notes are part of these financial statements.

ALBERTA HERITAGE FOUNDATION FOR MEDICAL RESEARCH

Statement of Revenue and Expenditure - Operating

For the Year Ended March 31, 1990

	1990	1989
Revenue		
Transfers from the Alberta Heritage Foundation for Medical Research Endowment Fund	$28,500,000	$34,000,000
Interest	805,606	777,015
	29,305,606	**34,777,015**
Expenditure		
Scientific programs:		
Scholarship and establishment grants	8,724,732	8,423,057
Building program grants	3,668,372	5,068,530
Fellowship grants and research allowances	2,993,218	4,415,232
Heritage medical scientist grants	2,759,163	2,869,548
Studentship grants and research allowances	2,740,923	3,175,545
Clinical investigatorship grants	2,524,838	1,838,173
Research support costs	2,341,855	2,467,467
Major equipment and maintenance grants	1,422,003	1,270,681
Independent establishment grants	1,297,236	1,572,835
Clinical fellowship grants	907,908	1,289,717
Institutional grants	904,385	1,391,615
Visiting lecturer grants to universities	354,672	312,868
Technology transfer grants	339,746	323,336
Special initiative grants	314,378	419,705
Travel grants to universities	239,599	249,203
Library grants	117,633	144,571
Technical workshop grants	111,238	506,928
Computer grants	100,000	100,000
Conference support grants	89,076	113,790
Visiting scientist grants	37,795	128,712
Animal resources	25,000	—
Independent research allowances	21,700	45,945
Visiting professor honoraria and travel grants	18,539	4,938
Clinical trainee grants	11,500	34,500
Recruitment and planning grants to universities	8,519	20,613
	32,074,028	36,187,509
Administration expenses, Schedule 1	1,117,482	1,076,110
Scientific Advisory Council expenses	83,820	52,331
Trustee expenses	145,012	109,413
Other committee expenses	108,068	95,970
	33,528,410	**37,521,333**
Deficiency of revenue over expenditure for the year	**$(4,222,804)**	**$(2,744,318)**

ALBERTA HERITAGE FOUNDATION FOR MEDICAL RESEARCH

Statement of Revenue Surplus - Operating
For the Year Ended March 31, 1990

	1990	1989
Revenue surplus at beginning of year	$5,149,441	$7,893,759
Deficiency of revenue over expenditure for the year	(4,222,804)	(2,744,318)
Revenue surplus at end of year	**$926,637**	**$5,149,441**

Statement of Revenue, Expenditure and Unexpended Funds - Medical Innovation Program (Note 6)
For the Year Ended March 31, 1990

	1990
Revenue	
Contributions from the Province of Alberta - General Revenue Fund	$3,733,000
Interest	262,669
	3,995,669
Expenditure	
Administration	91,040
Projects funded	520,675
	611,715
Unexpended funds at end of year	**$3,383,954**

Notes to the Financial Statements
March 31, 1990

Note 1: Authority

The Alberta Heritage Foundation for Medical Research operates under the authority of the Alberta Heritage Foundation for Medical Research Act, Chapter A-26, Revised Statutes of Alberta 1980, as amended.

Note 2: Significant Accounting Policies and Reporting Practices

Fixed Assets:

Fixed assets are stated at cost less accumulated depreciation.

Scientific Program Expenditures:

Building program grants are reported as expenditure in these financial statements as costs are reported by recipients. Other grants and allowances awarded by the Trustees of the Foundation are recorded as expenditure when the awardee has been notified of the amount of the award and all terms and conditions of eligibility for payment of the award have been met.

Changes in Financial Position:

A statement of changes in financial position is not provided as disclosure in these financial statements is considered to be adequate.

Note 3: Alberta Heritage Foundation for Medical Research Endowment Fund

The Endowment Fund operates pursuant to the Alberta Heritage Foundation for Medical Research Act and consists of an initial endowment of $300,000,000 from the Alberta Heritage Savings Trust Fund together with cumulative earnings thereon, less cumulative transfers to the Foundation.

Transfers to the Foundation are available at the request of the Trustees of the Foundation provided that such transfers do not result in the net assets of the Endowment Fund, as valued at cost, being less than the initial endowment.

The net assets of the Endowment Fund at March 31, 1990, as valued at cost, amounted to approximately $490,000,000, and at market value to approximately $493,000,000.

Note 4: Advances and Prepaid Expenses

	1990	1989
Unexpended funds held by universities:		
Travel grants	$132,764	$126,664
Visiting lecturers' grants	138,160	130,531
Interest earned on building program grants	255,988	221,243
Prepaid administration expenses	10,582	10,442
	$537,494	**$488,880**

Note 5: Fixed Assets

	1990	1989
Furniture and equipment at cost	$483,199	$451,335
Less: Accumulated depreciation	370,954	312,855
	$112,245	**$138,480**

Note 6: Medical Innovation Program

The Foundation administers funds for the Medical Innovation Program on behalf of the Minister of Technology, Research and Telecommunications. The program commenced effective April 1, 1988. No transactions occurred in the fiscal year 1988/89. The program is scheduled to end March 31, 1996 at which time all unallocated and undisbursed funds will be returned to the Minister.

Note 7: Commitments

As at March 31, 1990 the Foundation had committed $38,343,462 for scientific programs:

Scholarship and establishment grants	$16,969,826
Heritage medical scientist grants	7,460,170
Research support costs	4,287,610
Clinical investigatorship grants	3,900,160
Studentship grants and research allowances	1,693,591
Fellowship grants and research allowances	1,340,241
Independent establishment grants	618,198
Building program grants	420,268
Special initiative grants	404,901
Clinical fellowship grants	381,124
Other grants and allowances	347,500
Major equipment and maintenance grants	338,806
Institutional grants	135,349
Conference support grants	28,000
Visiting scientist grants	12,593
Visiting professor grants	5,125
	$38,343,462

These commitments pertain to the following fiscal years:

1990-91	$17,661,897
1991-92	9,314,643
1992-93	6,236,639
1993-94	3,453,871
1994-95	1,443,534
1995-96	232,878
	$38,343,462

Note 8: Pension Plan

The Foundation's pension plan is a defined benefit plan. Benefits are based on years of service and average salary in the final years of employment.

The plan status as at March 31, 1990 is as follows:

Assets	$379,000
Less: Actuarial value of accrued pension benefits	317,000
Excess balance	**$62,000**

Note 9: Comparative Figures

The 1989 figures have been reclassified where necessary to conform to 1990 presentation.

Note 10: Approval of Financial Statements

These financial statements were approved by management.

ALBERTA HERITAGE FOUNDATION FOR MEDICAL RESEARCH

Schedule of Administration Expenses
For the Year Ended March 31, 1990

	1990	1989
Salaries	$486,204	$546,089
Rental of premises	120,487	117,920
Stationery, printing and office supplies	83,480	49,936
Consultancy	80,394	53,470
Public relations and advertising	74,786	40,935
Depreciation	58,099	62,735
Employee benefits	49,432	55,148
Travel and accommodation	40,087	27,670
Maintenance	29,276	29,323
Postage and courier	21,658	21,246
Vehicle	19,267	17,762
Telephone	17,677	14,755
Insurance	14,719	16,625
Contracted employment services	13,403	—
Recruitment	3,900	—
Legal	3,152	20,380
Staff training	1,063	—
Miscellaneous	398	2,116
	$1,117,482	**$1,076,110**